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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/873,931

06/04/2001

Robert D. Horning

H16-16009 US

4429

7590

01/04/2006

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EXAMINER

RAO, SHRINIVAS H

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 01/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/873,931

Applicant(s)

HORNING ET AL.

Examiner

Steven H. Rao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 19-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 19-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

Acknowledgement is made of papers filed on October 21, 2205 claiming priority from U. S. Serial No. 09/873931 which was filed on June 04, 2001, therefore currently the earliest available filling date is June 04, 2001.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114.

Applicant's submission filed on October 21, 2005 has been entered.

Therefore claims 19 and 28, as amended by the amendment and claims 20-27 and 29-36 as previously recited are currently pending .

Information Disclosure Statement

No further IDS after the one filed on September 22, 2005 (mail date July 08, 2005) have been filed in this case.

Claim Rejections - 35 USC Section 1 03

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Patentability shall not be negated by the manner in which the invention was made.

Claims 19-21 and 28-30 are rejected under 35 U.S.C. 103 as being obvious over Wu et al. in view of Radamson et al. (Electrical characterization and strain compensation effect and thermal stability of B-doped Si-Ge/Si hetero structures by H. H. Radamson, O. Nur et al., Linköping University, Sweden)

With respect to claim 19, Wu describes a device produced according to the method of claim 19 (Wu lightly doped silicon substrate having first and second side and less than $5 \times 10^{19} \text{ cm}^{-3}$ boron therein - Wu fig. 1D col. 4 line 29., placing a p⁺ layer on the first side of the substrate having a boron content of greater than $7 \times 10^{19} \text{ cm}^{-3}$ and a Germanium germanium content of $1 \times 10^{21} \text{ cm}^{-3}$ to form a low germanium doped etch stop (Wu - col. lines 20-25., $21 \times 10^{19} \text{ cm}^{-3}$ boron - abstract line 14, etch stop - Wu title etc.).

Wu does not specifically describe the limitation to produce a strain compensated p⁺ layer.

However Radamson article describes in page 1397 left hand column 1st full paragraph) that that Ge concentration results in strain compensated layer, to produce devices having both low hall and drift mobilities.

Therefore it would have been obvious to one of ordinary skill in the art at the time

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of the invention to include Radamson's description of low germanium content (preferably range of $0 < x < 0.23$) in Wu's device. The motivation to make the above combination is to produce devices having both low hall and drift mobilities. (Radamson abstract last two lines).

The remaining limitations of claim 19 are: Forming a mask on the second side to etch a predetermined pattern- Wu.col. 8 lines 5-10, 30-40, etched second side of the p + layer Wu col. 8 lines 6-7,35-40, lines an insulator on said p+ layer and fabricating an electronic component on said insulator (insulator fig. 10 in the embodiment when layer 1008 is bulk insulating material, col.13 lines 50-54 - col. 14 lines 7-10 and electronic components - col. 7 lines 50-60).

With respect to claim 20, Wu describes the device of claim 19, wherein said boron content is greater than $1 \times 10^{20} \text{ cm}^3$ (Wu col. 4 line si and the germanium of bout $0.5 \times 10^{21} \text{ cm}^{-3}$ to about $2.0 \times 10^{21} \text{ CM}^{-3}$. (Wu col. 10 line 20-content is from a 25) .

With respect to claim 21 Wu describes the device of claim 19, wherein said micromechanical. structure is a pressure sensor. (Wu col. 7 lines 54,58-59).

With respect to claim 28, Wu describes a device produced according to the method of claim 19. Claim 28 repeats the elements of claim 19 and recites an buried p+ layer below the lightly doped layer (Wu figure 1D).

With respect to claim 29, Wu describes the device of claim 28, wherein said boron content is greater than $1 \times 10^{20} \text{ cm}^3$ about $0.5 \times 10^{21} \text{ cm}^{-3}$ to about $2.0 \times 10^{21} \text{ CM}^{-3}$. (Wu col. 10 line zo-content is rom a 25).

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(Wu col. 4 line 11 and the germanium

With respect to claim 30, Wu describes the device of claim 28, wherein said micromechanical structure is a pressure sensor. (Wu col. 7 lines 54,58-59).

B. Claims 22, 27 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu et al. (U.S. Patent No. 6,521,041, herein after Wu) in view of Radamson et al. (Electrical characterization and strain compensation effect and thermal stability of B-doped Si-Ge/si hetero structures by H. H. Radamson, O. Nur et al. , Linkoping University , Sweden) as applied to claims 19-21 above and further in view of Stemme et al. (U.S. Patent No. 6,546,804, herein after Stemme).

With respect to claims 22 and 31 Wu describes the device of claim 21.

Wu does not specifically describe the electronic component is selected from the group consisting of dielectrically isolated piezoresistors and resonant microbeams.

However Stemme in col. 4 lines 11-12 and col. 7 lines 14 describes electronic component is selected from the group consisting of dielectrically isolated piezoresistors and resonant microbeams to form ultraminiaturized sensors having high sensitivity in a cost effective manner .

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to specify Stemme's dielectrically isolated piezoresistors and resonant microbeams for the unspecified sensors of Wu in Wu's device to form ultraminiaturized sensors having high sensitivity in a cost effective manner . (Stemme col. 2 lines 38-48).

With respect to claim 27 The device of claim 19, wherein said micromechanical structure includes a dielectrically isolated piezo resistor formed on a top surface of a

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first wafer, a second wafer is bonded to said first wafer, and said second wafer forms a single crystal piezo resistor. (Stemme fig. 16 and col. 2 lines 20-36 Wu figure 10).

C. Claims 23 to 26 , 32 to 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu et al. (U.S. Patent No. 6,521 ,041, herein after Wu) in view of Radamson et al. (Electrical characterization and strain compensation effect and thermal stability of B-doped Si-Ge/si hetero structures by H. H. Radamson, O. Nur et al. , Linkoping University , Sweden) and Stemme et al. (U.S. Patent No. 6,546,804, herein after Stemme) as applied to claims above and further in view of Nilsson et al. (U.S. Patent No. 6,252,335, herein after Nilsson).

With respect to claims 23 and 32 Wu describes the device of claim 19.

Wu and Stemme do not specifically describe the micromechanical structure is a cantilevered accelerometer.

However Nilsson in its abstract line 1, etc. describes a cantilevered beam 'accelerometer to obtain a beam sensor that is small, very sensitive but with minimal orthogonal sensitivity and is highly resistant to shocks.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include Nilsson's cantilevered accelerometer as the beam sensor described by Wu and Stemme in their (WU and Stemme's) devices to obtain a beam sensor that is small, very sensitive but with minimal orthogonal sensitivity and is highly resistant to shocks. (Nilsson col. 1 lines 45 to 52).

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With respect to claims 24 and 33 Wu, Stemme and Nilsson describe the device of claim 23, wherein said electronic component is selected from the group consisting of dielectrically isolated piezoresistors and resonant microbeams. (Stemme in col. 4 lines 1 1-12 and col. 7 lines 14).

With respect to claims 25 and 34 Wu, Stemme and Nilsson describe the device of claim 19, wherein said micromechanical structure is a dual web biplane accelerometer formed by forming a said p+ layer on both sides of said substrate, forming a proof mask and flexure etching on both sides of said layer until said etching reaches said p+ layers. (Nilsson figure 1, figure 6, col. 4 lines 33 to 44).

With respect to claims 26 and 35 Wu, Stemme and Nilsson the device of claim 25, wherein said electronic component is selected from the group consisting of dielectrically isolated piezoresistors and resonant microbeams. (Stemme in col. 4 lines 1 1-12 and col. 7 lines 14).

With respect to claims 31 and 35 Wu, Stemme and Nilsson describe the device of claim 30, wherein said electronic component is selected from the group consisting of dielectrically isolated piezoresistors and resonant microbeams.

With respect to claims 32 and 36 Wu, Stemme and Nilsson describe the device of claim 28, wherein said micromechanical structure is a cantilevered accelerometer.

Response to Arguments

Applicants' first contention that their present claims should be limited to only to Si wafers that are doped with a small amount of Ge to form a low germanium etch stop is not persuasive for several reasons.

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The limitation to form a low germanium etch stop is also taken to be a particular intended use See Ex parte Masham , 2 USPQ 2d 1647 (1987) . It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus / device from the prior art apparatus/device satisfying the claimed structural limitations .

Applicants' contention that Radamson does not teach use of Ge to dope Si to create a strain compressed p + layer is not persuasive because (as stated in the rejection above AND REPRODUCED HERE TO FINALLY settle this matter after stating it at least THREE (3) times "Radamson article describes in page 1397 left hand column 1St full paragraph) that that Ge concentration results in strain compensated layer , to produce devices having both low hall and drift mobilities. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include Radamson's description of low germanium content (preferably range of $0 < x < 0.23$) in Wu's device."

Applicants' attempt to bring up "alloy of SiGe" is a weak attempt at clouding non existant issues or an attempt to hood wink the examiner which fails miserably to convince anybody .

Therefore it is respect fully submitted that all of Applicants' presently recited claims are rejected over prior art of record.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. Rao whose telephone number is (571)272-1718. The examiner can normally be reached on 8.00 to 5.00.

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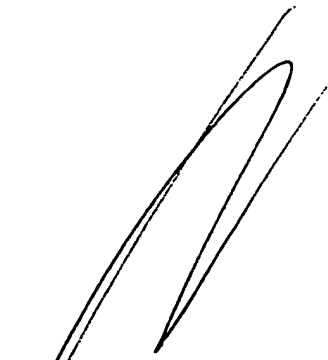
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Fahmy Wael can be reached on (571) 272-1714. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Steven H. Rao

Patent Examiner

December 28, 2005.



LONG PHAM
PRIMARY EXAMINER